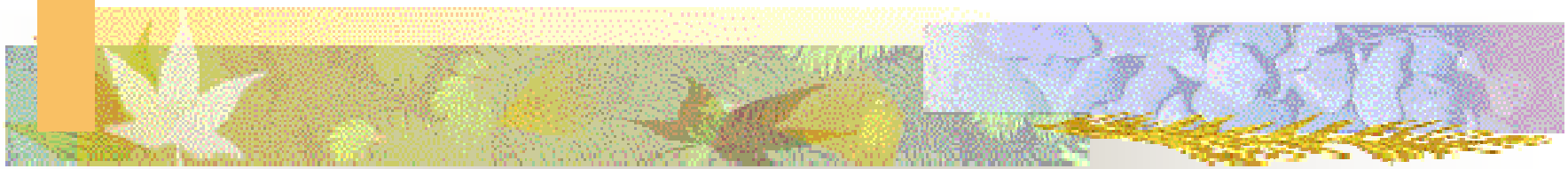
"Health and Environmental Quality in WA State: Making the Links" Preliminary Findings



Kate Davies M.A., D.Phil.,

Dietrich Hauge B.Sc., and

Gary Lichtenstein B.S.

Objectives:

- ***To collect and summarize information on the links between population health and environmental quality in WA State***
- ***To assess the adequacy of this information***
- ***To identify information gaps and research needs on how environmental quality affects population health***

Collecting and Summarizing Information On:

- *Soil, air and water quality*
- *The indoor/home environment and food*
- *Body burdens*
- *Health outcomes*
  - *Asthma, cardiovascular disease, other respiratory conditions*
  - *Cancers*
  - *Reproductive effects*
  - *Birth defects and developmental effects*
  - *Neurobehavioral effects*

Design:

- *Focused on chemical exposures and related effects*
- *Excluded occupational exposures/effects*
- *Chemicals of concern and health effects identified using the Collaborative for Health and Environment's spreadsheet on 'Chemical Contaminants and Human Disease'*

Design:

- *Collect and summarize existing information, including:*
  - *Environmental monitoring studies*
  - *Risk assessments*
  - *Epidemiological studies*
  - *Health surveillance studies*
  - *Published studies and 'grey' literature*

- *Second phase will document economic costs*

Soil and Dust: Ambient Contamination

- *One statewide risk assessment: Approximately 1 million residents live in areas likely to have more than 20 ppb of arsenic in the soil*
- *"Dirt Alert" studies: King, Kitsap, Pierce, and Thurston Counties*
- *Household dust*
  - *PAHs 1 –100 ppm in an eight home study*
  - *PBDEs 5,912 ppb in one Seattle sample*

Health Assessments at Superfund Sites:

- *47 Superfund sites*
  - *King and Spokane (8)*
  - *Kitsap (7)*
  - *Pierce (6)*
- *23 sites with health assessments*
  - *Most risk assessments*
  - *Focus on cancer and "non carcinogenic effects"*

Environmental Justice/Equity:

- *1995 DOE study:*
  - *A disproportionately greater number of "environmental facilities" in low income and minority areas*
  - *Toxic chemical release data indicate some disproportionate distribution, although less*
  - *Greater disproportionate distribution within counties, than at a state level*
  - *No epidemiological data*

Air Quality:

- ***Strong evidence that air quality can cause or worsen lung-related diseases such as asthma, CVD, emphysema, and chronic bronchitis***
- ***Air quality has improved over the past 15 years and is considered "moderate to good"***
- ***But approximately 1,400 people die each year from fine particulates in WA***

Air Quality:

- *14 areas of the State have been designated as violating the national ambient air quality standards. Over 3 million people live in these areas*
- *National Air Toxics Assessment (1996) shows that King County ranked among the dirtiest/worst 10% of all counties in the US in terms of the number of people living in areas where noncancer risk from hazardous air pollutants exceeds 1.*
- *1,730,356 people in King County face a cancer risk more than 100 times the goal set by the Clean Air Act.*

Drinking Water Quality:

A study of Seattle's drinking water found:

- ***Watershed controls are among the best***
- ***Exceeded national action level for lead***
- ***Had high levels of chlorination by-products***

Lead in school drinking water:

- ***70/88 Seattle schools tested had at least one fountain above the national action level***

Well water quality:

- ***Arsenic, nitrates, pesticides***

The Indoor/Home Environment:

- ***Radon***
  - ***Exposure at home causes lung cancer. Acts synergistically with smoking***
  - ***Ten counties have high radon potential and one (Spokane) has very high potential***
  - ***Levels are higher in eastern counties***
  - ***An estimated 400,000 residents live in homes with high or very high potential***

The Indoor/Home Environment:

- *Pesticide Use*
  - *No data available on the use of pesticides at home/indoors in WA State*
  - *City of Seattle and King County report reduced amount used in recent years*
- *12% of WA adults exposed to Environmental Tobacco Smoke at home: 7% at work*
- *Consumer products*

Pesticide Use:

- *Pesticide Incident Reporting and Tracking*
  - *DOH (2001): 200 incidents involving 250 people*
  - *Washington Poison Center (2001): 2,100 calls on pesticides*
- *Data on agricultural use:*
  - *2001 data from National Agricultural Statistics Service*
  - *WA Department of Agriculture maintains list of pesticide sensitive individuals*

Chemical Contaminants in Food:

- *WA data in the Total Diet Study:*
  - *More samples in WA than any other State*
  - *1993 Spokane, 1994 Seattle, 1995 Tacoma, 2001 Spokane*
  - *Data on pesticides, metals and metaloids*
- *Analysis of national data*
  - *Virtually all food products contain POPs banned in the US*
  - *Some food items contain residues of 3-7 POPs*
  - *Western US diet: approx 66 exposures per day*

Fish Consumption

- *13 site specific fish and shellfish consumption advisories (2003)*
- *Lake WA PCB advisory (2004)*
- *No coastal fish consumption advisories*
- *Fish contamination:*
  - *PCBs in all samples exceeded National Toxics Rule criterion*
  - *Mercury present in all samples*

Body Burden:

- *No State-wide regular biomonitoring*
- *Blood lead registry (children)*
  - *State-wide (1999) – "several thousand" children have levels above the national average (2.7ug/dL)*
  - *1994/97 study in Bellingham, Seattle, Spokane, Tacoma, Yakima – "low risk of lead poisoning".*
  - *1992 western WA study found that 4.5% of sample had levels above 10 ug/dL*

Body Burden:

- ***Nearly all children in Seattle have measurable levels of organophosphate pesticides metabolites in their urine***
- ***Levels of PBDEs in samples of breast milk from Puget Sound higher than Texas, Canada, Sweden, or Japan***
- ***Mercury risk assessment showed that high fish consumers may face 50X the cancer risk of general public***

Health Outcomes: Asthma

Adults:

- ***Prevalence in WA is 14.3% over lifetime (national prevalence is 11.8%).***
- ***WA has second highest prevalence rate in the country and is increasing over time***

Children:

- ***Rate in western US is lower than other regions of US but increasing over time (like adults)***
- ***Older children in WA have higher rates:***

0-4 y	*7.2%*
5-12 y	*10.2%*
13-17 y	*14.5%*

Health Outcomes: Asthma Hospitalization

- *Hospitalizations rates higher in western WA*
- *Rates have decreased from 1995-98 in all age groups*

Age Group	*Rate per 100,000 (1998)*
0-4	*293.9*
5-17	*86.6*
18-34	*48.6*
35-64	*64.9*
65+	*106.5*

Health Outcomes: Cardiovascular Disease

- *Growing evidence that CVD is associated with air quality (particulates, CO, SO2)*
- *Mortality (2001) 270 per 100,000.*
- *Rank 16th nationally*

Health Outcomes: Cancer

- *75% of cancer cases are related to environmental exposures in US*
- *We looked at 23 types of cancer with strong or moderately strong evidence of environmental causes*
- *Cancer in WA*
  - *25% of deaths statewide*
  - *Leading cause of death in 45-74 yrs age group*

Health Outcomes: Cancer

Type	Incidence in WA 2001	National Rank	Top County
Breast	181.7	1st	San Juan
Lung	70.1	9th female 30th male	Mason
Melanoma	37.6	1st females 5th males	Pend Oreille
Bladder	23.7	24th female 8th male	Pend Oreille
NH lymphoma	21.1	6th female 4th male	Walla Walla

Childhood Cancer

	WA	*National*
Brain	*3.0*	*2.7*
Leukemia	*4.1*	*4.1*

0-19 years – incidence per 100,000 2001

Costs of Childhood Cancer:

	# diagnosed 2001	Cost per Child (2004 $)	Total Cost (2004 $)	EAF	Cost of EAF
Includes loss of future income	308	723,817	222,935,636	2% **5%** 10% 80% 90%	4,458,713 **11,146,782** 22,293,564 178,348,509 200,642,072
Excludes loss of future income	308	591,752	182,259,616	2% **5%** 10% 80% 90%	3,645,192 **9,112,981** 18,225,962 145,807,693 164,033,654

Health Outcomes: Other Effects

- *We looked at 24 reproductive, birth, developmental and/or neurobehavioral effects*
- *Most with strong associations with environmental factors*
- *Very little WA specific data available*

Health Outcomes: Other Effects

ADD/ADHD/ Hyperactivity	*Cognitive impairment*	*Endometriosis*	*Parkinson's*
Autism	*Congenital malformation*	*Fetotoxocity*	*Pre-term delivery*
Altered time to sexual maturation	*Decreased coordination*	*Genito-urinary malformations*	*Reduced fertility- female*
Behavioral problems	*Decreased IQ/ Retardation*	*Low birth weight*	*Reduced fertility – male*
Cardiac congenital defects	*Delayed growth*	*Minamata disease*	*Skeletal mal-formations*
Cerebral palsy	*Develop-mental delay*	*Neural tube/CNS defects*	*Seizures*

Health Outcomes: Reproductive Effects

- *Data on reduced male fertility is equivocal*
  - *European and US Studies show a decrease*
  - *Seattle study showed no decrease*
- *12.7% of births pre-term (national rate 11.8%)*
- *Low birth weight: 5.9 per 100 (national rate 7.7 per 100)*
- *Infant mortality: 5.3 per 1,000 (national rate 7.0 per 1,000)*

Health Outcomes: Birth Defects and Developmental Effects

- *3% of all birth defects and developmental disabilities caused by environmental exposures*
- *12 million children (17%) have a developmental disability in US*
- *Learning disabilities affects 5-10% of children. Increase of 191% 1977-94*
- *No publicly accessible birth defects registry in WA*
- *2,400-3,200 children diagnosed annually in WA with birth defects*

Health Outcomes: Neurobehavioral Effects

- *Decreased IQ/mental retardation: 5.8 per 1000 (national rate 7.6 per 1000)*
- *Parkinson's Disease 4.5-21 per 100,000*
- *Unable to find WA data on:*
  - *ADD/ADHD/hyperactivity?*
  - *Autism?*
  - *Behavioral problems?*
  - *Cognitive impairment?*
  - *Decreased coordination?*
  - *Minamata?*
  - *Seizures?*

Preliminary Report Card: Adequacy of Data

Soil/Dust Quality	*B/C*	*Asthma*	*A*
Air Quality	*A/B*	*CVD*	*A/B*
Drinking Water	*B/C*	*Cancer*	*A*
Indoor/home	*C*	*Reprod.*	*C*
Food	*B*	*BD & DD*	*D/F*
Body Burden	*D*	*NB*	*F*

Preliminary Findings: Needs

- *Link environmental and population health information geographically and over time*
- *Publicly accessible, querable databases*
- *WA specific exposure data for general public*
- *Better health surveillance information*
- *Epi studies targeted "at risk" populations*
- *Start with the DOE's Working List of PBTs*